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(54) **METHOD AND SYSTEM FOR PROVIDING NETWORK ANALYSIS OF A HYBRID TELEPHONY NETWORK**

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(51) **Int. Cl.**

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G06F 15/173	(2006.01)
G01R 31/08	(2006.01)
G06F 3/00	(2006.01)
H04M 7/00	(2006.01)
H04L 12/24	(2006.01)
H04M 3/00	(2006.01)
H04Q 3/00	(2006.01)
H04L 29/08	(2006.01)

(52) **U.S. Cl.**

CPC ***H04M 7/0081*** (2013.01); ***H04L 12/24*** (2013.01); ***H04M 3/00*** (2013.01); ***H04Q 3/0045*** (2013.01); ***H04Q 3/0062*** (2013.01); ***H04L 67/34*** (2013.01)

(58) **Field of Classification Search**

USPC 709/220, 223, 224; 370/230, 232, 346; 715/700, 738

See application file for complete search history.

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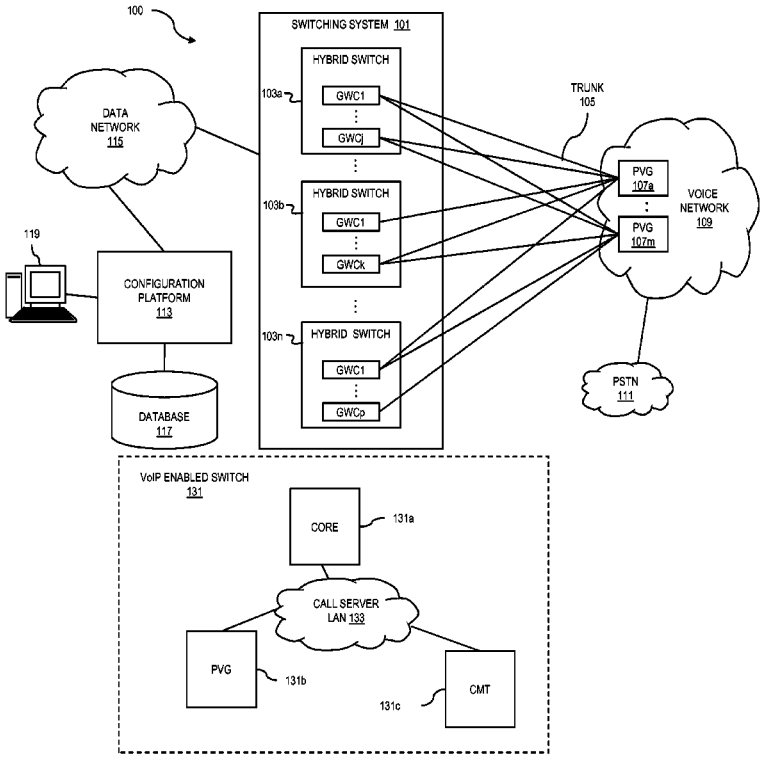
Assistant Examiner — Farrukh Hussain

(57) **ABSTRACT**

An approach is provided for analyzing a hybrid telephony network. A plurality of nodes within a network is polled for configuration information, wherein the nodes are configured to establish packetized voice sessions. The configuration information is correlated. A view of the nodes and associated circuits is presented to a user for configuring one or more of the nodes based on the correlation.

16 Claims, 14 Drawing Sheets



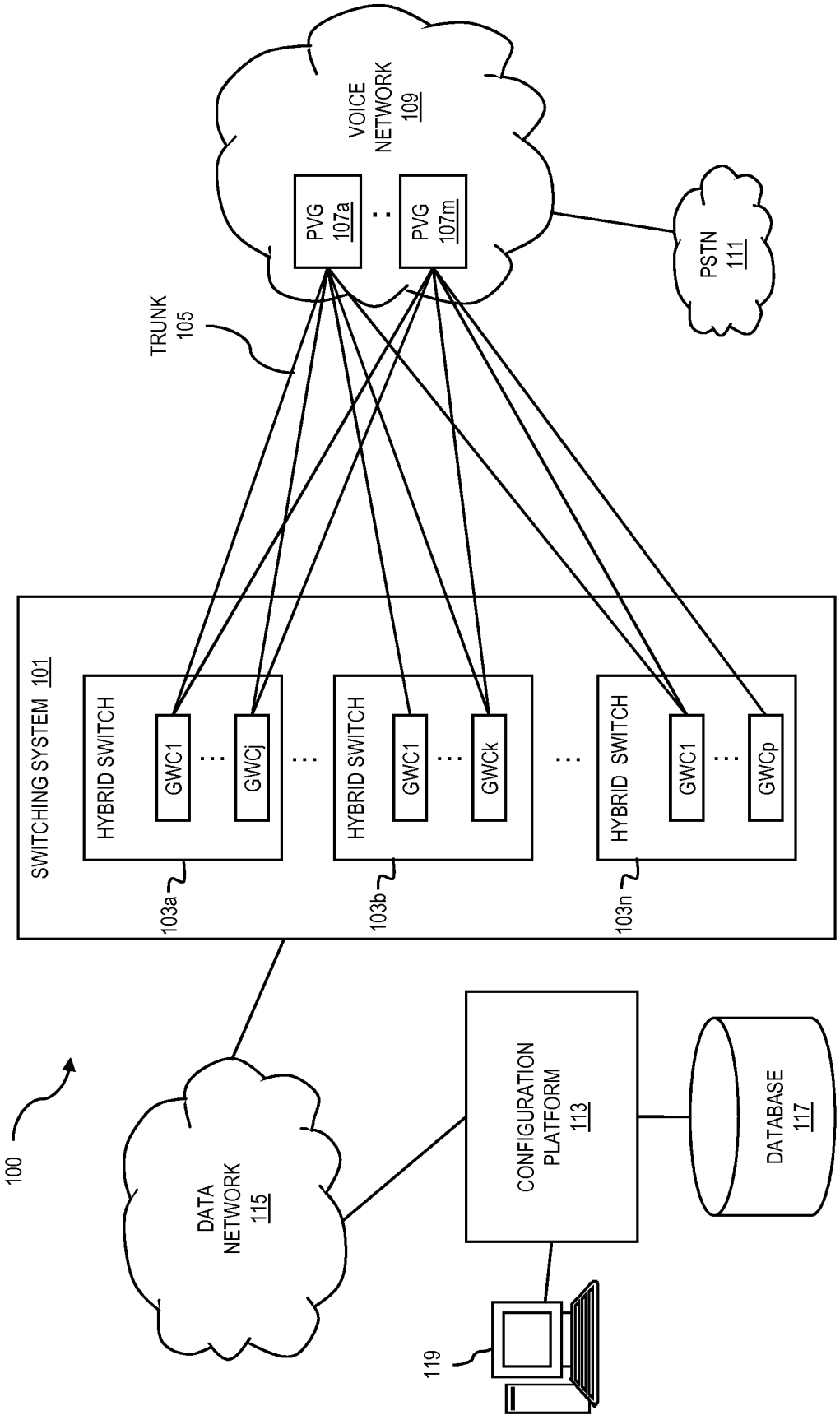

VOICE NETWORK 109
PVG 107a
PVG 107m
PSTN 111
TRUNK 105
SWITCHING SYSTEM 101
HYBRID SWITCH
GWC1
GWCj
GWCk
GWCp
103a
103b
103n
100
DATA NETWORK 115
CONFIGURATION PLATFORM 113
DATABASE 117
119

FIG. 1A

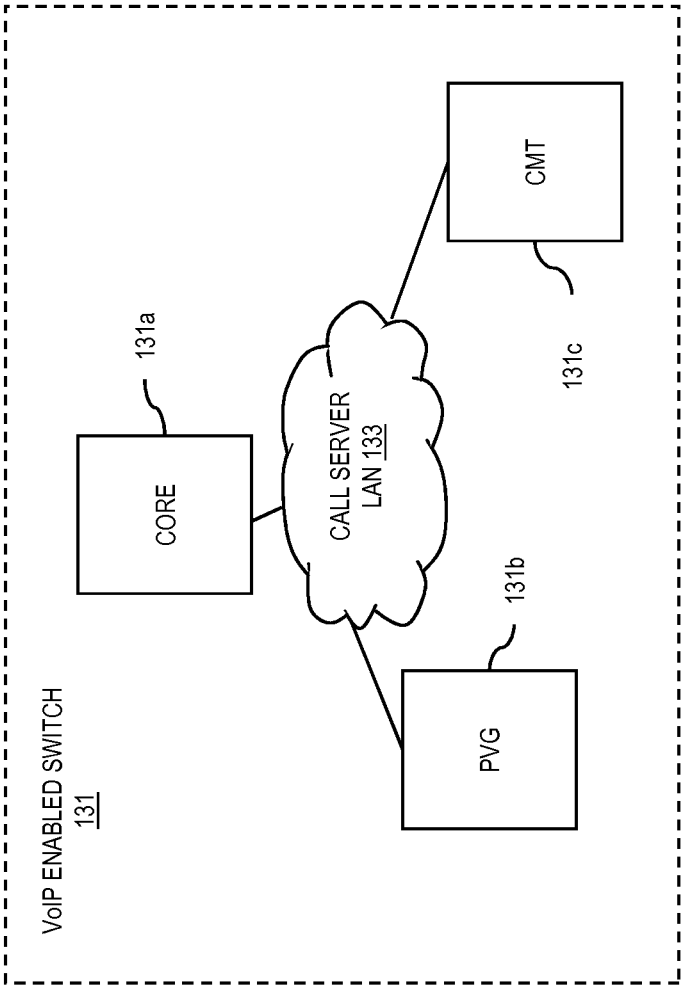

VoIP ENABLED SWITCH
131
CORE
131a
CALL SERVER
LAN 133
CMT
131c
PVG
131b

FIG. 1B

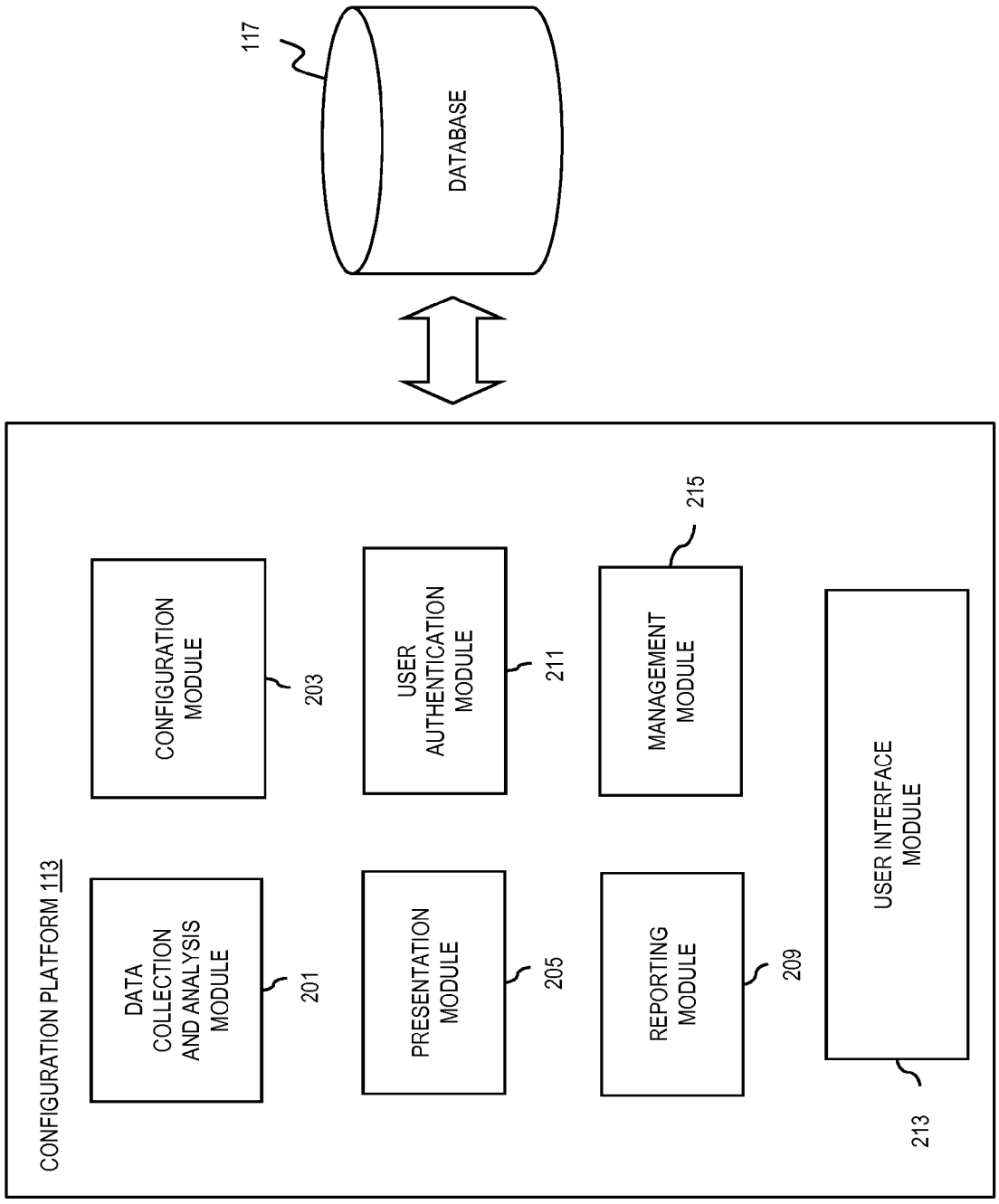

117
DATABASE
CONFIGURATION PLATFORM 113
DATA COLLECTION AND ANALYSIS MODULE
201
CONFIGURATION MODULE
203
PRESENTATION MODULE
205
USER AUTHENTICATION MODULE
211
REPORTING MODULE
209
MANAGEMENT MODULE
215
USER INTERFACE MODULE
213

FIG. 2

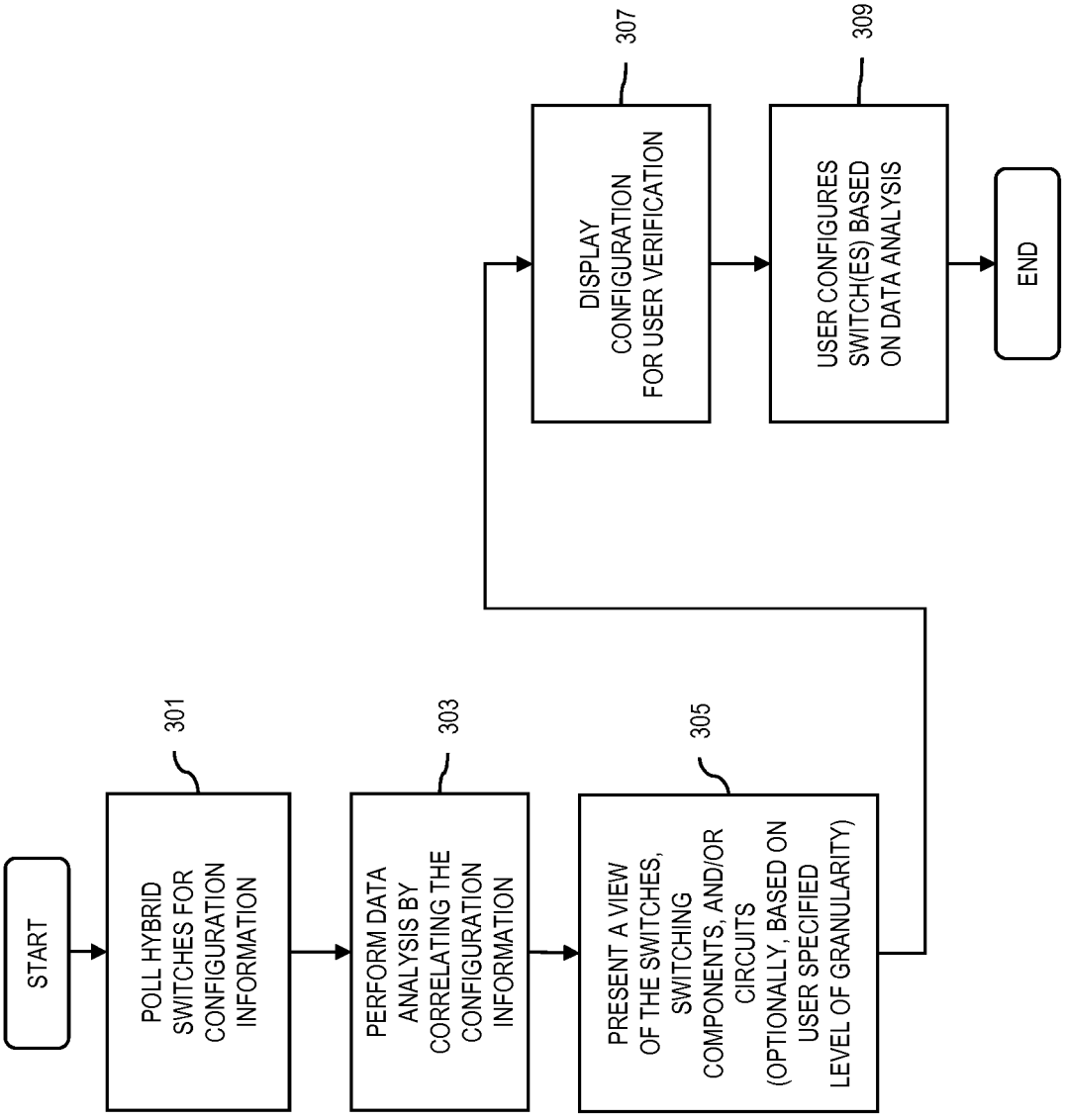

START
POLL HYBRID SWITCHES FOR CONFIGURATION INFORMATION
301
PERFORM DATA ANALYSIS BY CORRELATING THE CONFIGURATION INFORMATION
303
PRESENT A VIEW OF THE SWITCHES, SWITCHING COMPONENTS, AND/OR CIRCUITS (OPTIONALLY, BASED ON USER SPECIFIED LEVEL OF GRANULARITY)
305
DISPLAY CONFIGURATION FOR USER VERIFICATION
307
USER CONFIGURES SWITCH(ES) BASED ON DATA ANALYSIS
309
END

FIG. 3

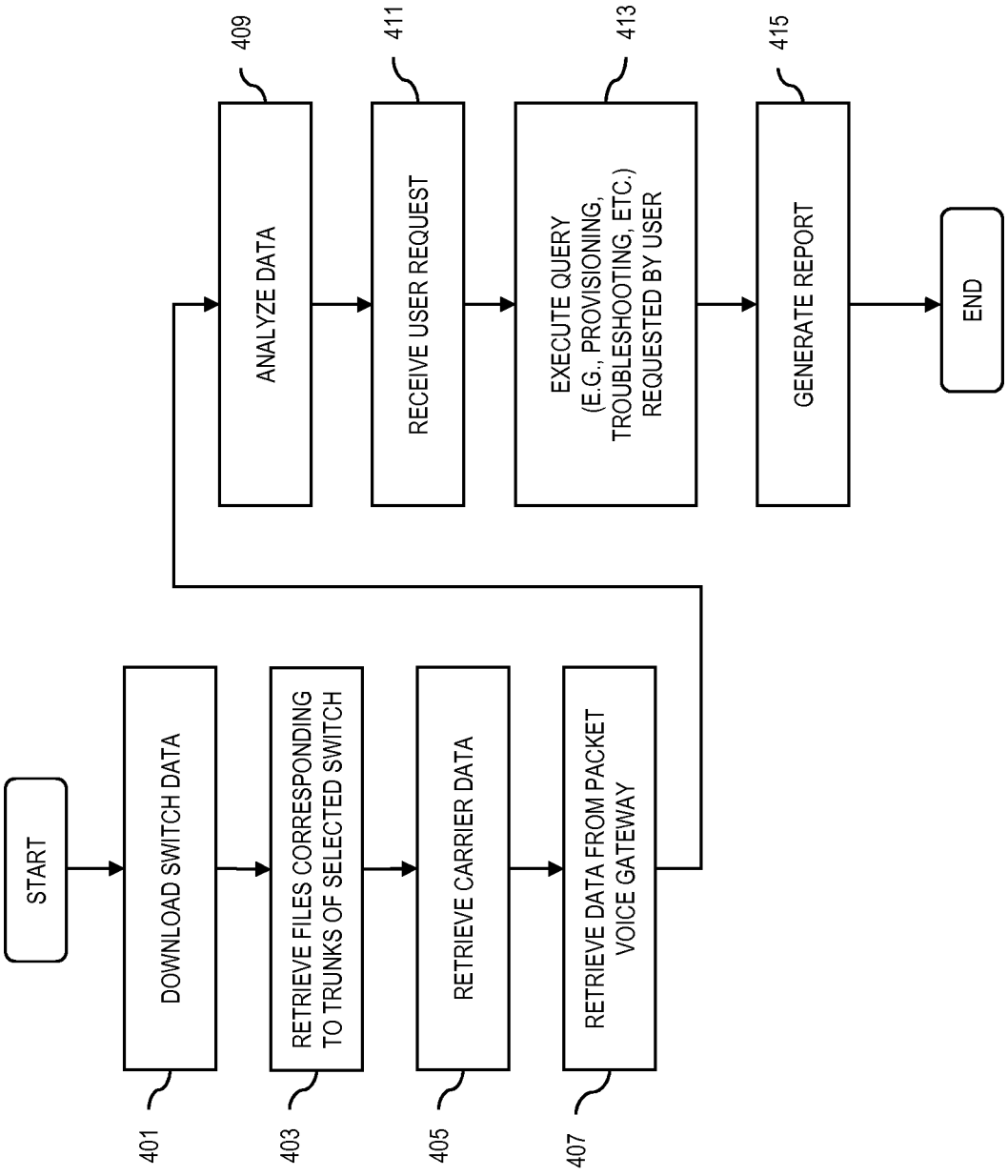

START
DOWNLOAD SWITCH DATA
RETRIEVE FILES CORRESPONDING TO TRUNKS OF SELECTED SWITCH
RETRIEVE CARRIER DATA
RETRIEVE DATA FROM PACKET VOICE GATEWAY
ANALYZE DATA
RECEIVE USER REQUEST
EXECUTE QUERY (E.G., PROVISIONING, TROUBLESHOOTING, ETC.) REQUESTED BY USER
GENERATE REPORT
END
401
403
405
407
409
411
413
415

FIG. 4

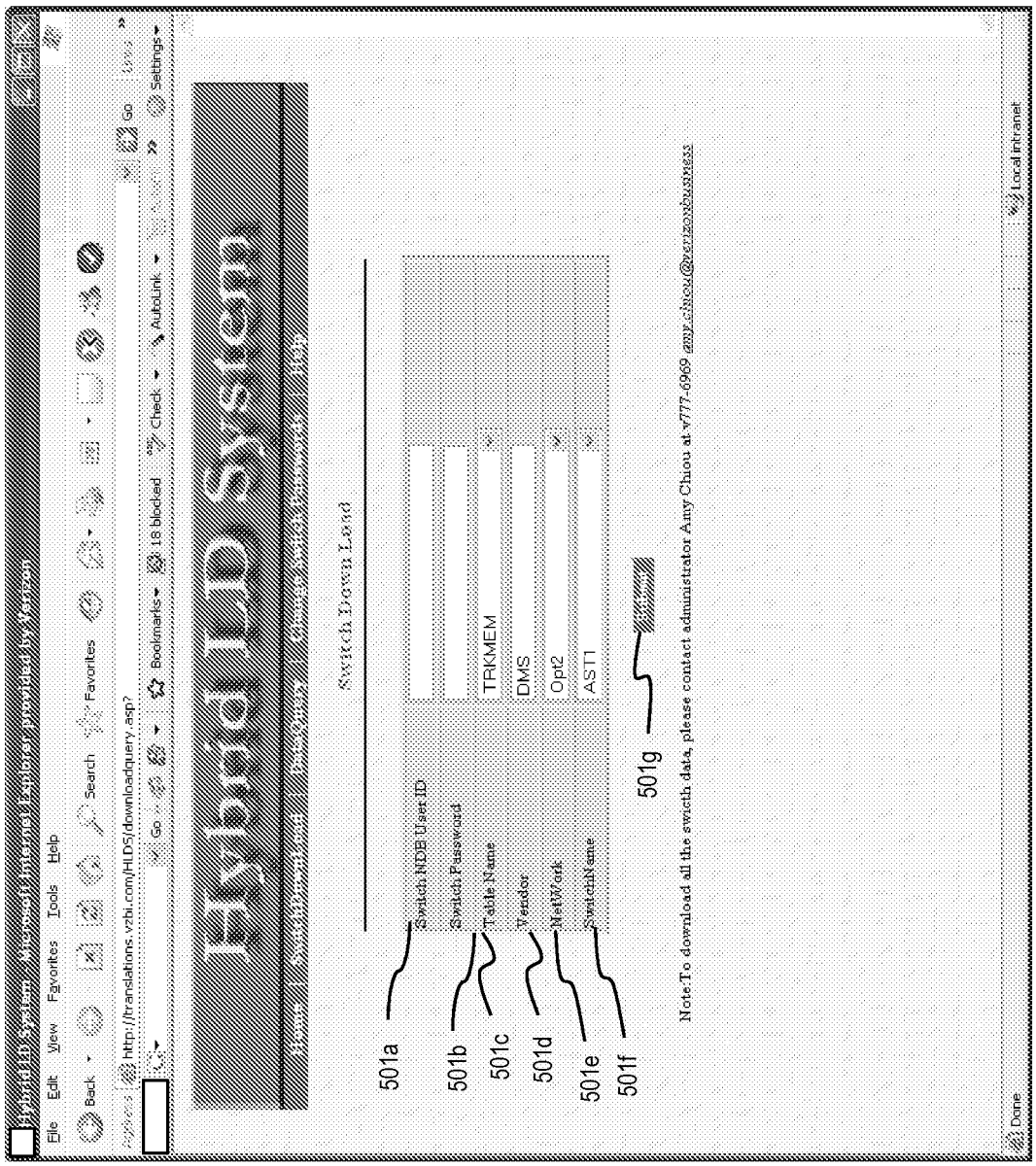

Hybrid HLDS system
Switch Data Load
Switch NDB User ID
Switch Password
Table Name
TRKMEM
Vendor
DMS
NetWork
Opt2
SwitchName
AST1
501a
501b
501c
501d
501e
501f
501g
Note:To download all the switch data, please contact administrator Amy Chiou at 777-6969 amy.chiou@verizonbusiness
501

FIG. 5A

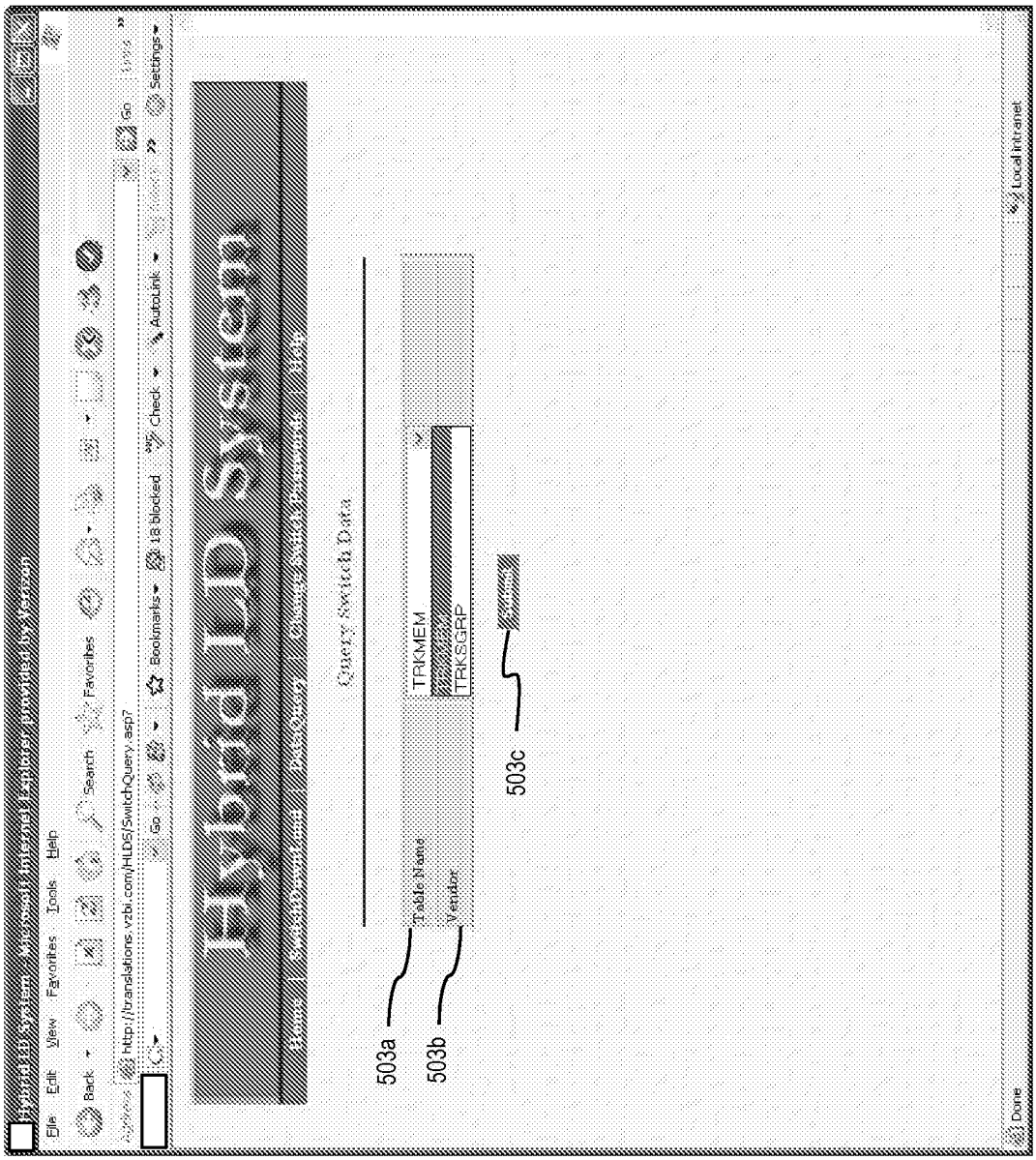

Hybrid LID System
Query Switch Data
Table Name
Vendor
TRKMEM
TRKSGRP
503a
503b
503c
503

FIG. 5B

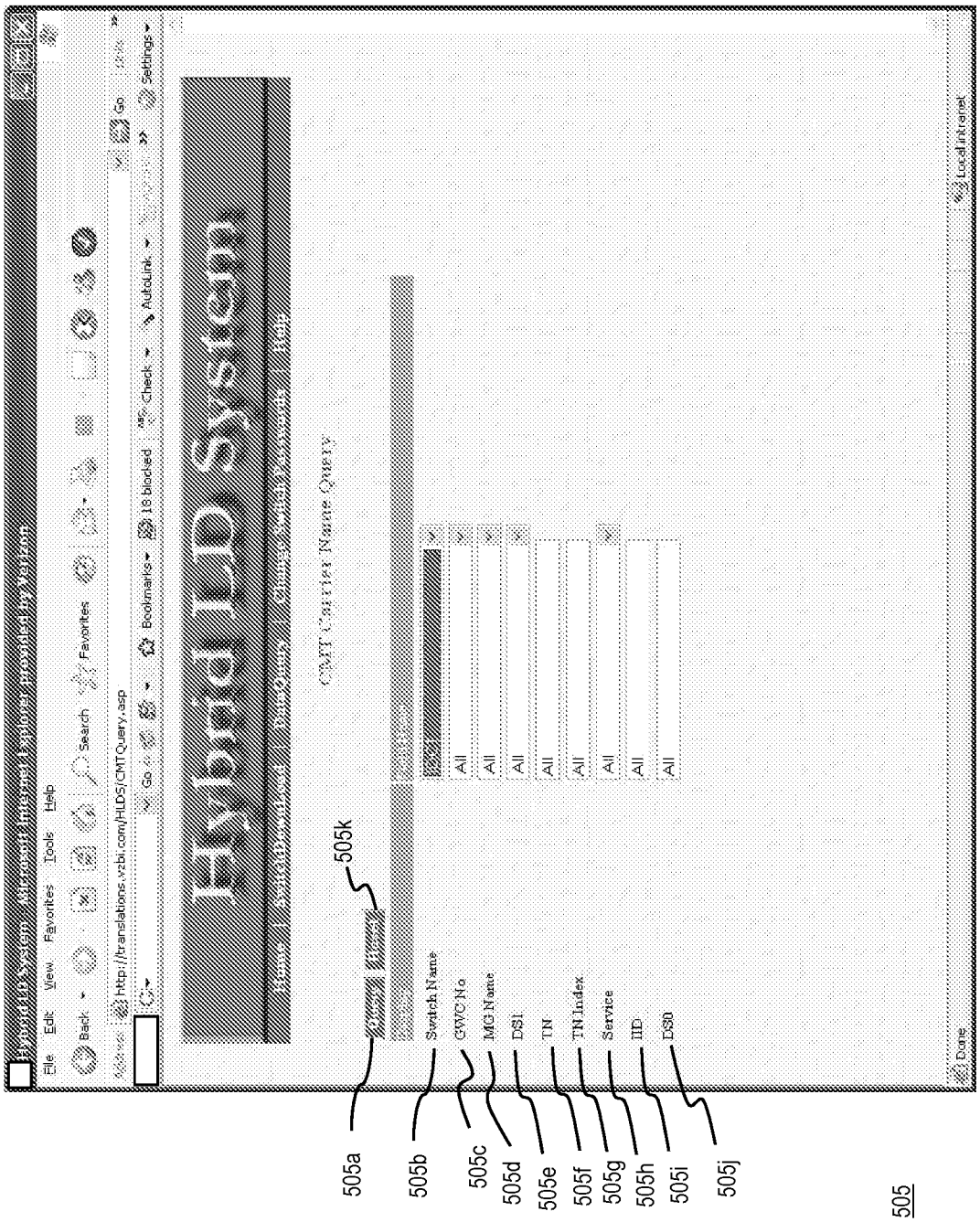

Hybrid LD System
CMT Carrier Name Query
Switch Name
GWC No
MG Name
DS1
TN
TN Index
Service
IID
DS0
All
505a
505b
505c
505d
505e
505f
505g
505h
505i
505j
505k
505

FIG. 5C

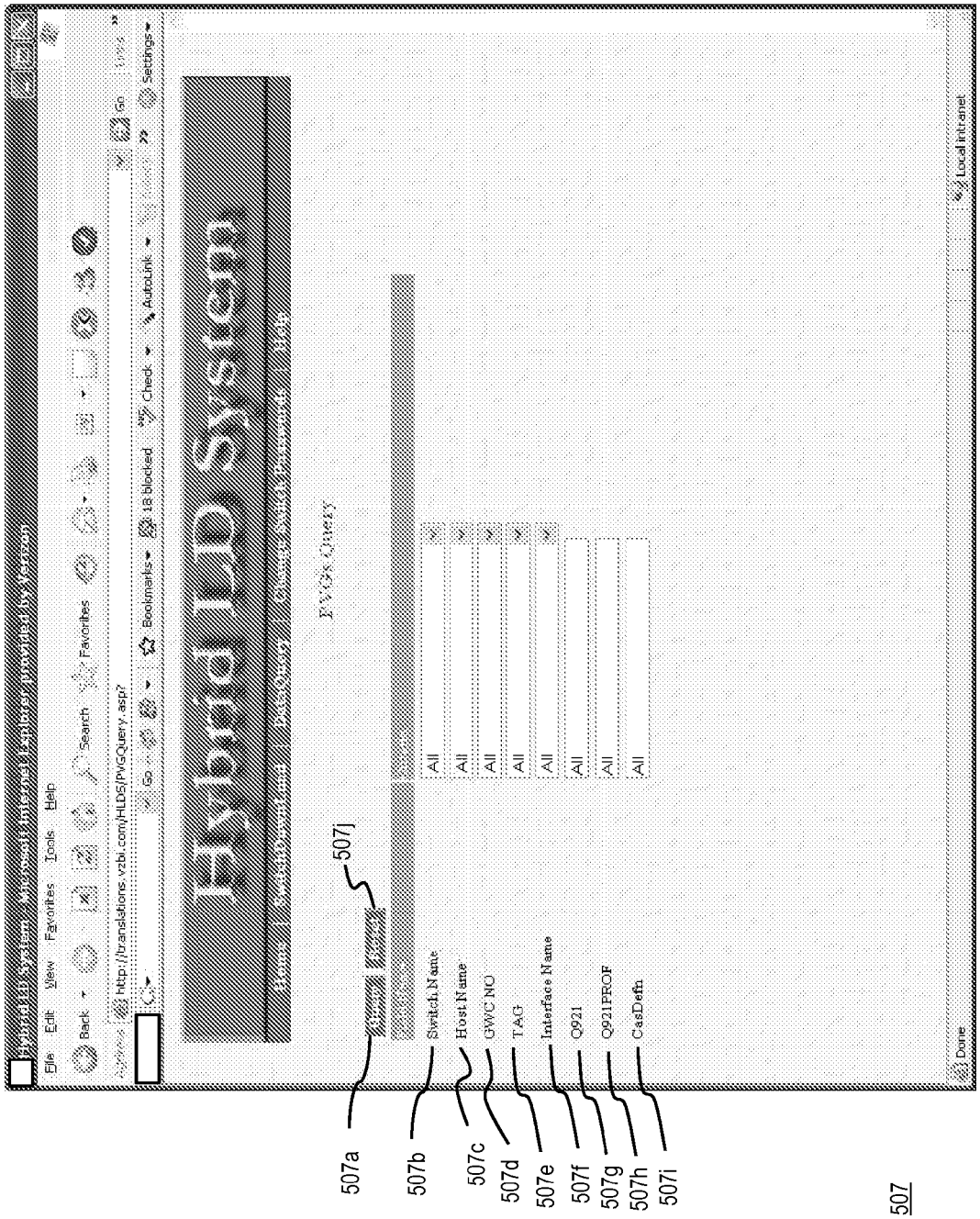

Hybrid LD System
PVGX Query
Switch Name
Host Name
GWC NO
TAG
Interface Name
Q921
Q921PROF
CasDefn
All
507a
507b
507c
507d
507e
507f
507g
507h
507i
507j
507

FIG. 5D

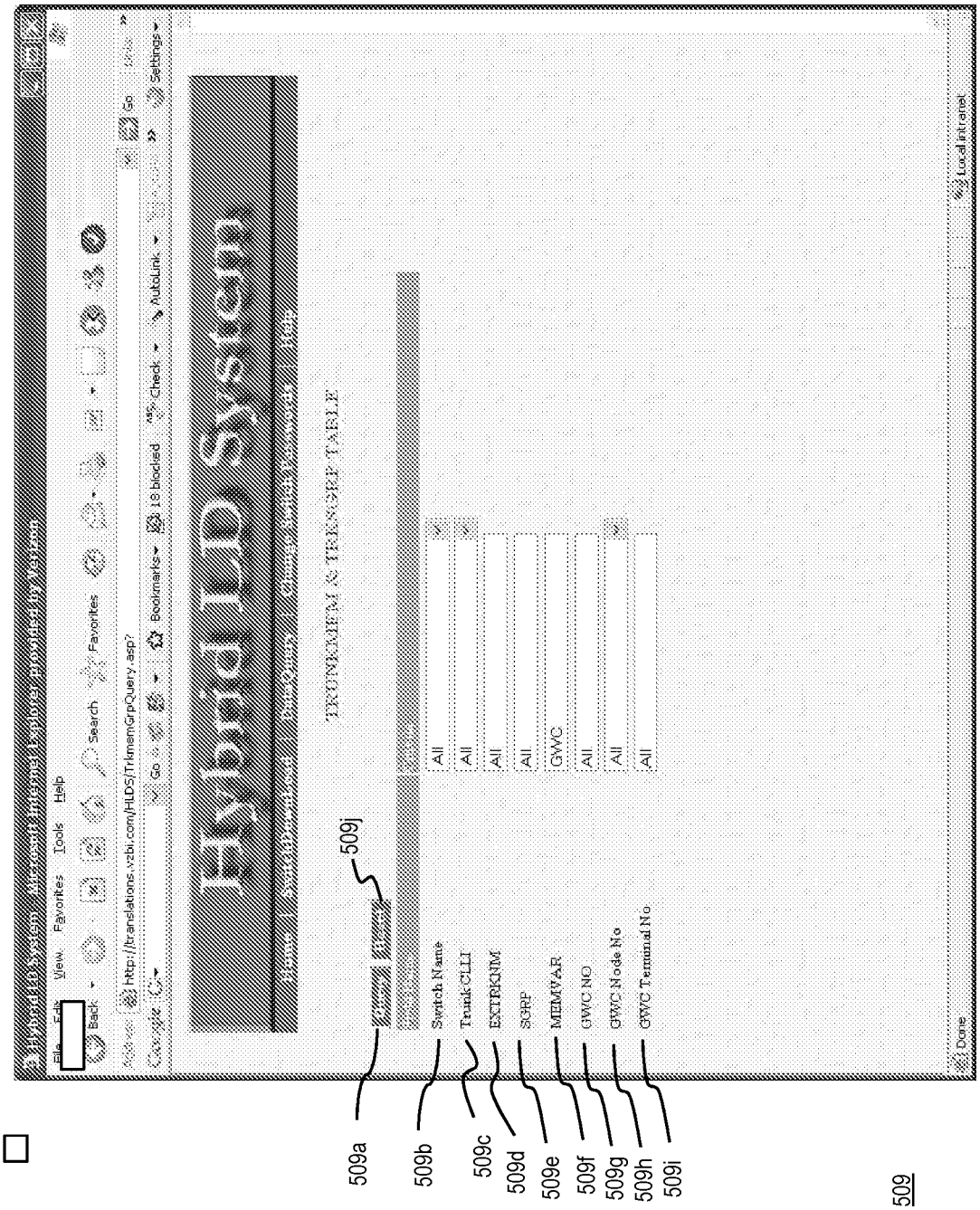

Hybrid LD System
TRUNK MEMBER & TRUNK GRP TABLE
Switch Name
Trunk CLLI
ESTRKNM
SORP
MEMVAR
GWC NO
GWC Node No
GWC Terminal No
All
GWC
509a
509b
509c
509d
509e
509f
509g
509h
509i
509j
509

FIG. 5E

FIG. 5F

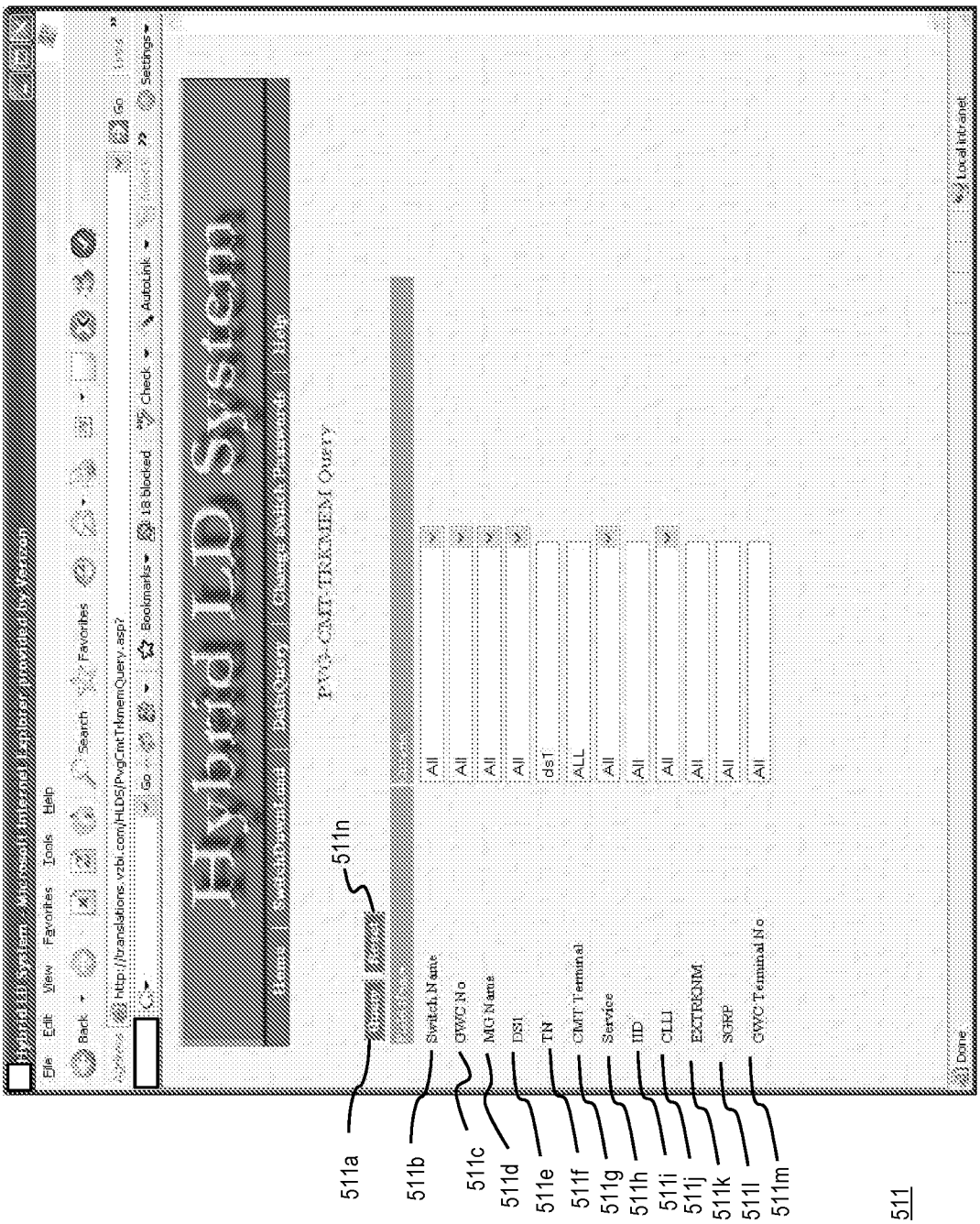
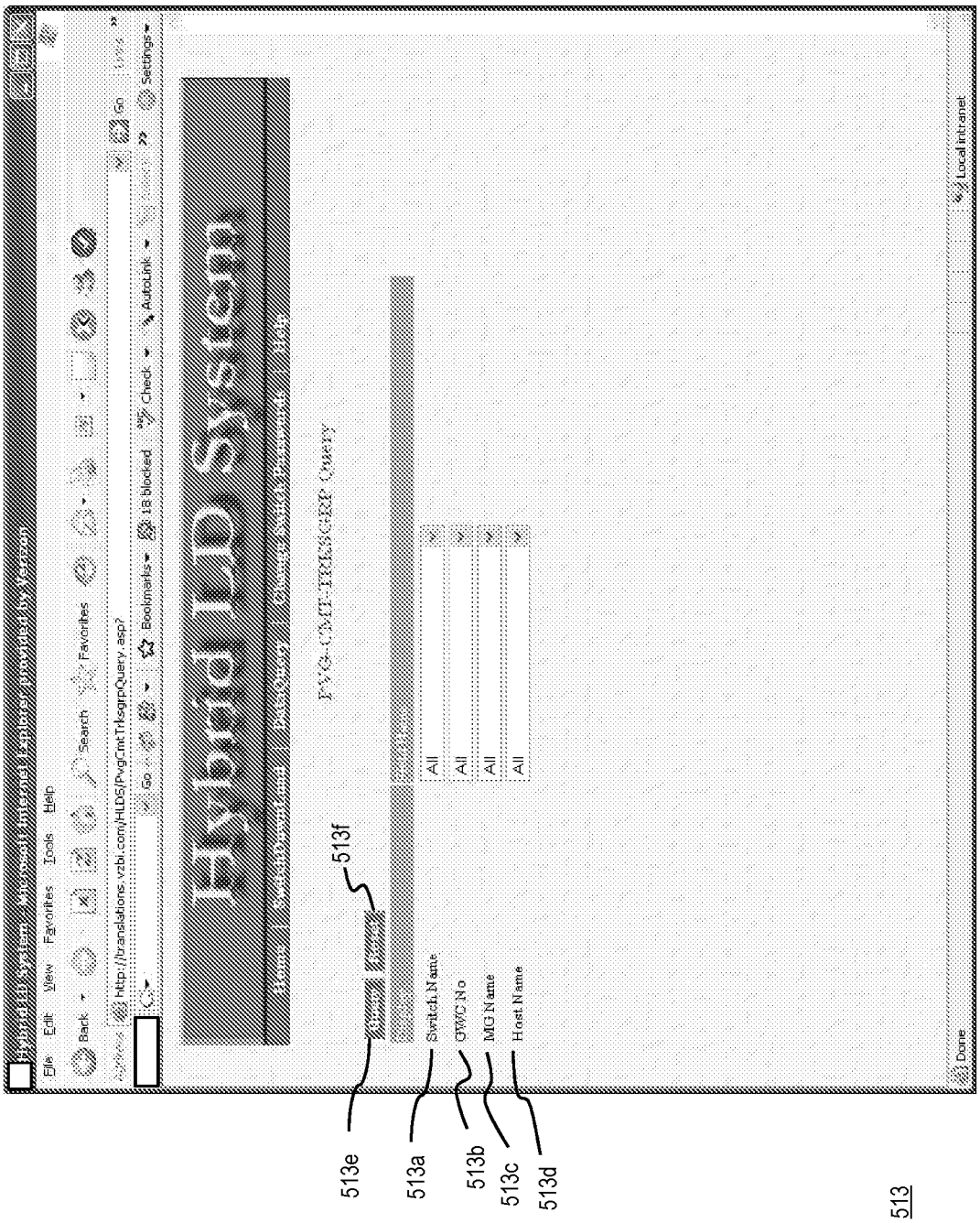

Hybrid LD System
PVG-CMT TRMEM Query
Switch Name
CWC No
MG Name
DS1
TN
CMT Terminal
Service
IID
CLLI
EXTRKNM
SGRP
CWC Terminal No
All
dsT
ALL
511a
511b
511c
511d
511e
511f
511g
511h
511i
511j
511k
511l
511m
511n
511

FIG. 5G


Hybrid LD System
513f
Switch Name
GWC No
MG Name
Host Name
All
513e
513a
513b
513c
513d
513

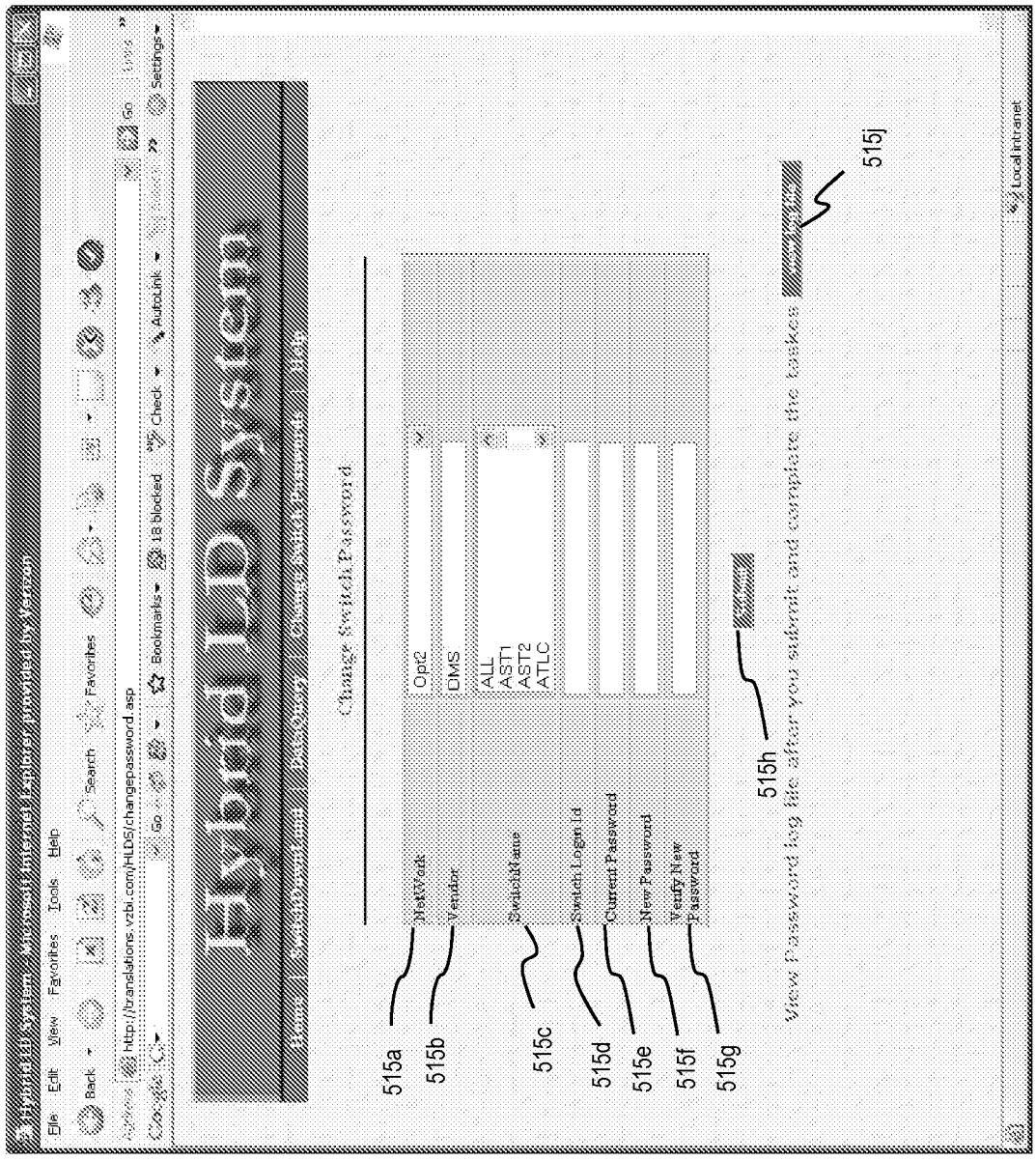

Hybrid LD system
Change Switch Password
NetWork
Vendor
SwitchName
Switch Login Id
Current Password
New Password
Verify New Password
515a
515b
515c
515d
515e
515f
515g
515h
515j
Local intranet

FIG. 5H

515

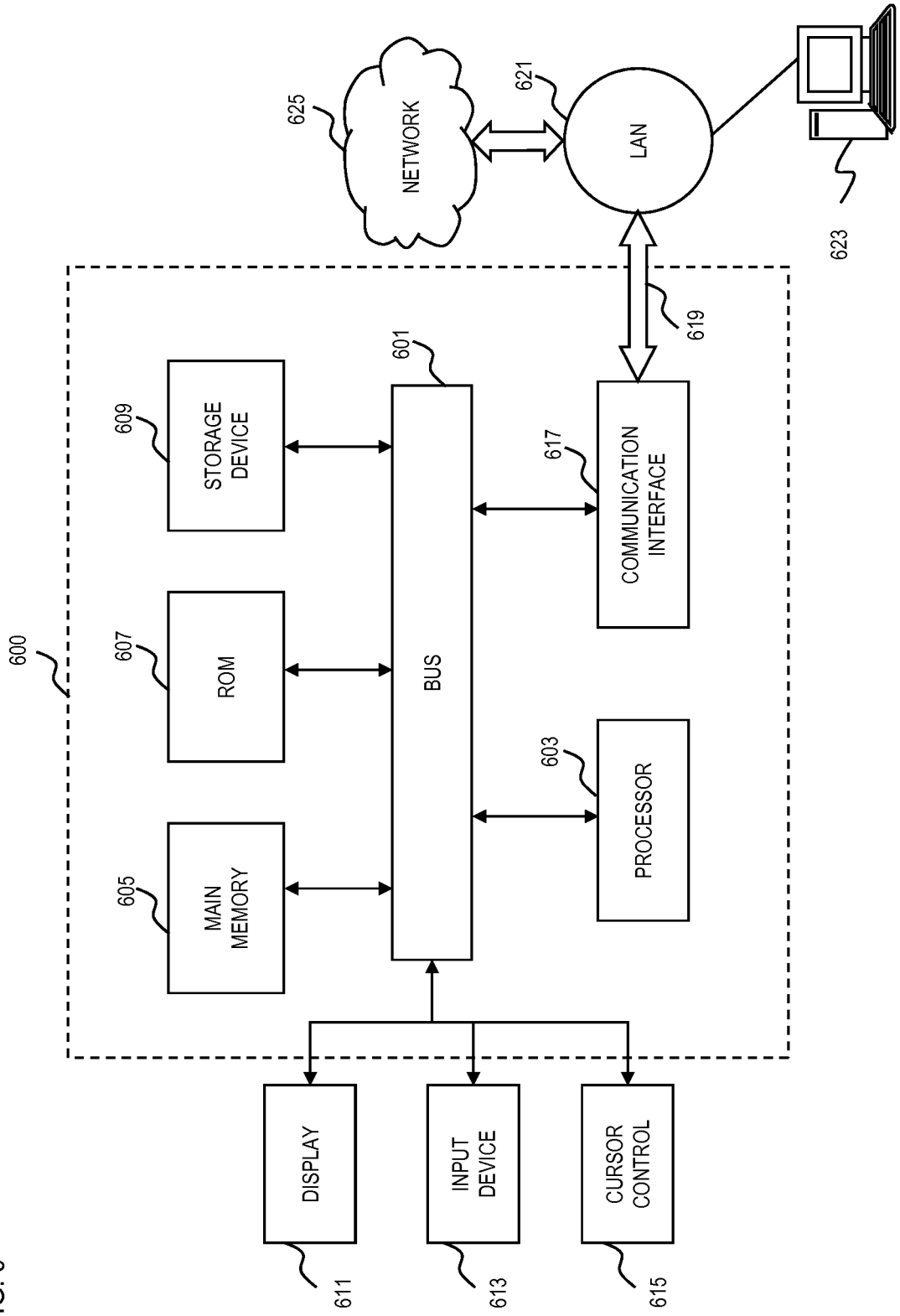

625
NETWORK
621
LAN
623
619
601
609
STORAGE DEVICE
617
COMMUNICATION INTERFACE
600
607
ROM
BUS
603
PROCESSOR
605
MAIN MEMORY
DISPLAY
INPUT DEVICE
CURSOR CONTROL
611
613
615

FIG. 6

METHOD AND SYSTEM FOR PROVIDING NETWORK ANALYSIS OF A HYBRID TELEPHONY NETWORK

BACKGROUND INFORMATION

Modern communication networks are growing in size and complexity. The convergence of voice and data applications and services continues to fuel the popularity of the global Internet. For example, use of Voice Over Internet Protocol (VoIP) has become a viable alternative to plain old telephone service (POTS) over traditional circuit-switched telephony systems. Furthermore, as the number and types of equipment used to provide VoIP applications increases, the process of provisioning and tuning communication systems becomes more complex. Traditional procedures for provisioning services in a circuit-switched environment lack applicability to packetized voice system, which has a distributed switching architecture. Consequently, ad hoc methods have developed, involving manually intensive tasks in configuring these packetized voice systems.

Therefore, a mechanism is needed to efficiently provide network analysis and configuration for packetized voice networks.

BRIEF DESCRIPTION OF THE DRAWINGS

Various exemplary embodiments are illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings in which like reference numerals refer to similar elements and in which:

FIG. **1** is a diagram of a system capable of automated collection and analysis of provisioning data, according to various exemplary embodiments;

FIG. **2** is a diagram of a configuration platform utilized in the system of FIG. **1**, according to an exemplary embodiment;

FIG. **3** is a flowchart of a process for configuring the system of FIG. **1**, according to an exemplary embodiment;

FIG. **4** is a flowchart of a process for collecting and analyzing data to configure the system of FIG. **1** in response to service provisioning or troubleshooting, according to an exemplary embodiment;

FIGS. **5**A-**5**H are diagrams of exemplary screens of a graphical user interface (GUI) for various services provided by the automated configuration system, according to various exemplary embodiments; and

FIG. **6** is a diagram of a computer system that can be used to implement various exemplary embodiments.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred apparatus, method, and system for providing automated data collection and analysis for provisioning packetized voice services are described. In the following description, for the purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the preferred embodiments of the invention. It is apparent, however, that the preferred embodiments may be practiced without these specific details or with an equivalent arrangement. In other instances, well-known structures and devices are shown in block diagram form in order to avoid unnecessarily obscuring the preferred embodiments of the invention.

Although various exemplary embodiments are described with respect to a Voice over Internet Protocol (VoIP) network providing long distance services, it is contemplated that these embodiments have applicability to any equivalent protocol and services.

FIG. **1** is a diagram of a system capable of automated collection and analysis of provisioning data, according to various exemplary embodiments. A communication system **100** includes a switching system **101** for providing, in certain embodiments, packetized voice communications. The switching system **101** utilizes multiple switches **103***a*-**103***n* deployed according to a distributed architecture to provide a variety of communication services, such a long distance voice communication. The system **101** can include a traditional Time-Division Multiplexing (TDM) switch, a VoIP switch, or a hybrid switch that provides both types to facilitate end terminals' establishing voice sessions. In this example, the switching system **101** provides hybrid switches **103***a*-**103***n* to implement Voice over Internet Protocol (VoIP). In part because of the distributed nature of switching system **101**, the provisioning of services traditionally is inefficient and manually intensive. Understandably, the provisioning systems and processes, which have been optimized for traditional telephony systems, have not been adapted to keep pace with newly developed technologies.

With conventional handling of voice communication services, typically a single switch element was involved. Hence, in general only a single switch is inspected and configured during the provisioning of new services or modifying existing services. As mentioned, modern switch equipment involves multiple elements, thereby complicating the provisioning process. As such several switching elements need to be investigated during, for example, the provisioning process. Furthermore, in this example, the system **100** provides VoIP enabled Public Switched Telephone Network (PSTN) long distance (LD) service, using multiple (e.g., three) classes of switching equipment. Such equipment are to be provisioned and turned up together. Moreover, as seen in FIG. **1**, the switches **103***a*-**103***n*, being distributed, do not communicate with each other in a way that is conducive for provisioning. As the number of elements increase, the task of provisioning increases in complexity and becomes more time consuming.

By way of example, each of the switches **103***a*-**103***n* includes one or more gateway controllers (GWCs). In one embodiment, a GWC is responsible for the registration and management of resources of one or more packet voice gateway (PVGs) **107***a*-**107***m*, which translate TDM calls to VoIP signaling and vice versa. The GWC receives signaling information (e.g., dialed digits) from the gateway **107***a*-**107***m* over corresponding trunks **105** and can instruct the gateway **107***a*-**107***m* to alert the called party, to send and receive voice data, etc.

A trunk **105** is a communication path connecting two switching systems or nodes in a network. A set of trunks that are traffic engineered as a unit in order to establish connections between switching systems (in which all of the communication paths are interchangeable) is referred to as a trunk-group.

As an example of the distributed nature of the switching system **101**, switches **103***a*-**103***n* may be located in geographically dispersed location than that of the PVGs **107***a*-**107***m*. For instance, the switches **103***a*-**103***n* may be situated in Dallas, Tex. while PVGs **107***a*-**107***m* are located in Oklahoma City, Okla.

The approach of system **100**, according to certain embodiments, stems from the recognition that provisioning and/or configuring system **100** is highly complex. The PVGs **107***a*-**107***m* provide access to a voice network **109**, which can be a circuit-switched voice network, and ultimately interface a

Public Switched Telephone Network (PSTN). As necessary, a PVG (e.g., PVG **107**) converts between different transmission and coding techniques. With respect to provisioning or troubleshooting, a user (e.g., system administrator, engineer, representative, etc.) in charge of provisioning should have knowledge of the particular PVGs that they should be logged on to for gathering of relevant information.

According to certain embodiments, a configuration platform **113** addresses the drawbacks of provisioning and configuration associated with switches that provide packetized voice communications. Among other functions, the configuration platform **113** collects data from the switching system **101** over a data network **115** and analyzes such data to provide provisioning. The data can be stored in a database **117** for later processing. The user can access the configuration platform **113** using a computing device **119**. This platform **113** polls the classes of equipment for their provisioning configuration data, links the data sets through operational relationships, and provides provisioning and configuration views at varying and selectable levels of granularity (e.g., from DS0, gateway controller, to per element view). The platform **113** additionally allows rapid configuration and provisioning of VoIP enabled LD network services, as well as rapid troubleshooting. The components of the configuration platform **113** are more fully described below with respect to FIG. **2**.

Regarding FIG. **1**B, an exemplary VoIP enabled switch **131** can be utilized in the switching system **101**. The switch **131** can include a core **131***a*, a PVG **133***a*, and a Communication Management Tool (CMT) **131***c*, which communicate over a call server local area network (LAN) **133**. As applied to the system **100**, the CMT **131***c* monitors the communication between the GWCs and the PVGs **107***a*-**107***m*. The switch **131** can be configured by the configuration platform **113** in response to various requests, e.g., provisioning, troubleshooting, fault recovery, and etc.

FIG. **2** is a diagram of a configuration platform utilized in the system of FIG. **1**, according to an exemplary embodiment. The platform **113** can download a list of equipment, manage credentials, automatically compile necessary datasets from the equipment, and correlate the datasets to manage of the network **100**. For the purposes of illustration, the configuration platform **113** performs network analysis and configuration using the following components: a data collection and analysis module **201**, a configuration module **203**, a presentation module **205**, a reporting module **209**, a user authentication module **211**, and a user interface module **213**. Additionally, the configuration platform **113** may include a management module **215** for providing fault management, configuration management, performance management, and security management.

It is contemplated that these components **201**-**215** can be combined in various forms, depending on the application. The data collection and analysis module **201** collects data from switching elements (e.g., GWCs, PVGs), and stores the collected information into the database **117**. The module **201** also analyzes the data to permit proper configuration of the switching elements. Such configuration can be performed by the configuration module **203**.

The presentation module **205** messages the collected data and associated analysis for transmission to the user via, in an exemplary embodiment, a web interface, such as a browser.

The reporting module **209** affords the user the capability to select or design a format for delivery of information. Further, the platform **113** utilizes the user authentication module **211** to ensure that only authorized users an access the switching elements and the configuration platform **113** itself. That is, the user authentication module **211** allows only certain registered users with assigned privileges to conduct data collection and analysis procedures and access the collected data and data analysis results.

Moreover, the user interface module **213** can process input (e.g., requests) from a user, and to relay such input to the appropriate module. For example, the data collection and analysis module **201** can handle queries from the user relating to the analysis of the data.

FIG. **3** is a flowchart of a process for configuring the system of FIG. **1**, according to an exemplary embodiment. This process is described, by way of example, with respect to the components of the configuration platform **113** of FIG. **2**. In step **301**, the data collection and analysis module **201** collects configuration information (e.g., PVC and CMT data) from the switches **103***a*-**103***n* and associated switching elements by polling the switches **103***a*-**103***n*; in one embodiment, this information can be stored in an external data store (not shown) or server. That is, required data from various switching elements throughout the network are collected. The data collection and analysis module **201** allows a user to implement a certain schedule (e.g., time) when the data is automatically collected as on demand at any time; moreover, the schedule can be event driven, e.g., when a provisioning request is received.

Next, data analysis is performed, as in step **303**, to correlate the collected configuration information. The process then presents, via the presentation module **205**, a view of the network **100**—i.e., switches **103***a*-**103***n*, associated switching components, and/or circuits (or trunks)—to a user. In one embodiment, the view is displayed, per step **305**, using a graphical user interface (GUI), e.g., a web interface, to the user, who can optionally specify the level of granularity (with respect to the network elements or components) for this view. For example, the user may elect to be informed about the network resources at a component level (e.g., network cards, or line cards). With the web-interface, the user can indicate a desired function, such as provisioning, troubleshooting, etc., that entails reconfiguring the switching system **101**.

Thereafter, the user can verify the configuration, per step **307**.

In step **309**, the switches **103***a*-**103***n* are configured, by the user via configuration module **203**, based on the data analysis and in accordance with parameters associated with the particular function (e.g., service provisioning may specify a certain service level agreement (SLA), bandwidth requirement, etc.).

FIG. **4** is a flowchart of a process for collecting and analyzing data to configure the system of FIG. **1** in response to service provisioning or troubleshooting, according to an exemplary embodiment. This process is described with respect to the exemplary user interface of FIGS. **5**A-**5**H. In step **401**, a user can initiate collection of switch data using screen **501** (denoted "Switch Down Load" screen). The data can be distributed across a multitude of elements: switches **103***a*-**103***n*, CMT **131***c*, and gateways **107***a*-**107***m*. Such data can be stored in database **117** and subsequently queried as necessary.

As seen in FIG. **5**A, the Switch Down Load screen **501** prompts the user with a Switch User ID section **501***a* to allow the user to input a user identifier (ID) and associated password per a Switch Password section **501***b*. For example, this screen **501** permits the user to invoke a download process for the TRKMEM and TRKSGRP data from the core **131***a*, as well as the carrier data from the CMT **131***c*. The user ID and password information is used by the platform **113** to access the switching system **101**. Screen **501** also provides a Table Name section **501***c* for the user to indicate the desired infor-

mation, which in this example pertains to the trunks utilized by the subject switch. In other words, the user can input the desired switch table for download. The user can specify the particular switch through a Vendor section **501***d*, in which the user can indicate the manufacturer of the switch. Additionally, assuming the switching system **101** spans multiple networks, a Network section **501***e* permits the user to indicate the network in which the switch resides. Furthermore, screen **501** provides for the capability to specify the name of the switch with a SwitchName section **501***f*. Upon filling in the relevant information for sections **501***a*-**501***f*, the user can then submit the query by selecting a Submit button **501***g*.

Next, in step **403**, the platform **113** retrieves information (e.g., entire files) of the trunks associated with the selected switch. This retrieval can be executed using a "Query Switch Data" screen **503** (of FIG. **5**B), which provides the ability for the user to view the entire files of, for example, trunk member and subgroups of specific trunk-group tables for a selected switch. "TRKSGRP" lists supplemental information for each subgroup that is assigned to one of the trunk groups list in the table, TRKGRP. Screen **503** permits the user to input a table name with Table Name section **503***a*, and a vendor with Vendor section **503***b*. A Submit button **503***c* submits the query. Thus, the Query Switch Data screen **503** allows viewing of the TRKMEM or TRKSGRP data that have been downloaded into the system. Subsequent screens can request additional information to refine the query.

As part of the data collection, the process can additionally obtain carrier data (step **405**) from gateway elements (e.g., CMT **131***c*) corresponding to the switches **103***a*-**103***n*. A CMT Carrier Name Query screen **505** allows the user to retrieve carrier information at various levels of hierarchy from the CMT **131***c*. This process is facilitated by the user interface screen **505** of FIG. **5**C. By way of example, the screen **505** includes a Query button **505***a* to submit the query to collect information about the gateway. To support such query, the following sections are utilized: a Switch Name section **505***b* for the name of the particular switch, a Gateway Control Number ("GWC No.") section for indicating an identifier for the GWC, a MG Name section **505***d* for selecting a media gateway, a DS1 section **505***e* for inputting a particular carrier name at the DS1 level, a TN (terminal number) section **505***f* for specifying a terminal number, a TN Index section **505***g* to input a terminal index, a Service section **505***h* for selecting a service type (e.g., ISUP or PRI), an IID section **505***i* for specifying an interface ID, and a DS0 section **505***j* for inputting a particular carrier name at the DS0 level. Screen **505** also provides a Reset button **505***k* to clear the entries of the sections **505***a*-**505***j*. It is contemplated that, in addition or in the alternative, circuits other than DS0 (rate of 64 kbps) and DS1 (rate of 1.544 Mbps) can be employed. Depending on the design of the network **100**, other rates based on Synchronous Digital Hierarchy (SDH) can be supported, e.g., DS3 (rate of 44.736 Mbps).

In step **407**, configuration information associated with the packet voice gateways corresponding to the subject switches are retrieved. Such data collection can be performed using a "PVGs Query" screen **507** of FIG. **5**D. The PVGs Query screen **507** allows a user to display the PVG data that is provisioned for a given switch. In this example, a minimum of two entries are selected to indicate the desired data; one of which must be the switch name. As with the CMT Carrier Name Query screen **505**, this PVGs Query screen **507** includes a Query button **507***a* to initiate the data query. Here, the user can indicate various parameters: a SwitchName section **507***b* for selecting a particular switch of interest, a Host Name section **507***c* for inputting a host name, a GWC No. section **507***d* for specifying a gateway controller number, a TAG section **507***e* for providing a tag name for certain channels, an Interface Name section **507***f*, a Q921 section **507***g* for a Q921 value of a D-channel, a Q921PROF section **507***h* for indicating the value of a D-channel profile, and a CasDefn section **507***i* for indicating Cas channel AssosSignaling Definition.

Other query screens **509**-**513** are shown in FIGS. **5**E-**5**H, respectively. Screen **509** (denoted "TRUNKMEM & TRKSGRP TABLE") provides the user with TRUNKMEM data, including, for example, Integrated Services Digital Network (ISDN) D channel information. This screen **509** provides the user, upon selecting a Query button **509***a*, with the ability to gather information with more granularity using the following sections: Switch Name section **509***b*, Trunk CLLI (Common Language Location Identifier) section **509***c* for specifying the location and type of a piece of telecommunications equipment for each carrier, EXTRKNM section **509***d* for specifying an external trunk number, a SGRP section **509***e* for inputting a subgroup value (e.g., 0 or 1), a MEMVAR section **509***f* for specifying a variable name (e.g., GWC for gateway controller), a GWC No. section **509***g*, a GWC Node No. section **509***h*, and a GWC Terminal No. section **509***i*. As with the other query screens, a Reset button **509***j* is also utilized to easily clear the query input.

As seen in FIG. **5**F, a PVG-CMT TRKMEM Query screen **511**, which relates to the core, CMT, and PVG data, includes a Query button **511***a* for initiating a query, which can be based on the following sections: a Switch Name section **511***b*, a GWC No. section **511***c*, a MG Name section **511***d*, a DS1 section **511***e*, a TN (terminal number) section **511***f*, a CMT Terminal section **511***g*, a Service section **511***h*, an IID section **511***i*, a CLLI section **511***j*, an EXTRKNM section **511***k*, a SGRP section **511***l*, and a GWC Terminal No. section **511***m*. Screen **511** also provides a Reset button **511***n*.

Moreover, a PVG-CMT-TRKGRP Query screen **513** (FIG. **5**G) provides the links among PVG, CMT and TRKSGRP elements, allowing a user to view, e.g., Integrated Services Digital Network (ISDN) records associated with these three elements. This screen **513** displays data relating to the core **131***a*, CMT **131***c*, and PVG **131***b*. A query can be formed using the following fields or sections: a Switch Name section **513***a*, a GWC No. section **513***b*, a MG Name section **513***c*, and a Host Name section **513***d*. Additionally, screen **513** provides a Query button **513***e* and a Reset button **513***f*.

The PVG-CMT-TRKMEM query screen **511** provides the links among PVG, CMT and TRKMEM data elements. The screen **511** thus allows the user to easily find the associated PVG interface, CMT gateway data, and TRKMEM data. Additionally, the user can view the Carrier information from DS1 to DS0 level. Further, the user can view multiple CLLIs for each carrier, and the associated D-channel. Accordingly, the user can analyze the data across the three elements to verify whether the provisioning is correct.

Referring back to the process of FIG. **4**, in step **409**, the data collected is analyzed. The data analysis process includes finding existing links between the elements of Trunk-mem (the table of Trunk members) and Trunk-groups. This function, for example, can assist the user with provisioning, e.g., Integrated Services Digital Network (ISDN) services (which traditionally required complex coordination among different network elements), whereby the associated Integrated Services Digital Network (ISDN) record can be readily determined in the Trunk-group table.

In step **411**, the user can specify a query relating to configuration of the network **100** based on data available in the platform. For instance, the query can be used for provision-

ing, troubleshooting, fault recovery, etc. The query is then performed, resulting in a display of configuration data of the network **100** (step **413**). The results of the query are displayed to the user; for example, this can be in form of a report (step **415**).

FIG. **5**H depicts an optional screen **515** for the user to manage passwords to access the switches **103***a*-**103***n*. Accordingly, the Change Switch Password screen **515** includes sections to identify the particular switch: a Network switch **515***a*, a Vendor section **515***b*, and a Switch Name section **515***c*. Also, screen **515** utilizes a Switch Login ID section **515***d* for the user to input a user identifier. Sections **515***e* and **515***f* allow the user to provide the current password and a new password, respectively. This new password is then verified with a Verify New Password section **515***g*. Upon filling in the sections **515***a*-**515***g*, the user can submit the request for changing the password. In one embodiment, a View Log File button **515***j* provides a status report of the password changes for the switches **103***a*-**103***n*.

The above process, according to certain embodiments, advantageously provides an efficient, automated mechanism for configuring network elements in support of VoIP services.

The processes described herein for configuring a distributed switching system may be implemented via software, hardware (e.g., general processor, Digital Signal Processing (DSP) chip, an Application Specific Integrated Circuit (ASIC), Field Programmable Gate Arrays (FPGAs), etc.), firmware or a combination thereof. Such exemplary hardware for performing the described functions is detailed below.

FIG. **6** illustrates computing hardware (e.g., computer system) upon which an embodiment according to the invention can be implemented. The computer system **600** includes a bus **601** or other communication mechanism for communicating information and a processor **603** coupled to the bus **601** for processing information. The computer system **600** also includes main memory **605**, such as random access memory (RAM) or other dynamic storage device, coupled to the bus **601** for storing information and instructions to be executed by the processor **603**. Main memory **605** also can be used for storing temporary variables or other intermediate information during execution of instructions by the processor **603**. The computer system **600** may further include a read only memory (ROM) **607** or other static storage device coupled to the bus **601** for storing static information and instructions for the processor **603**. A storage device **609**, such as a magnetic disk or optical disk, is coupled to the bus **601** for persistently storing information and instructions.

The computer system **600** may be coupled via the bus **601** to a display **611**, such as a cathode ray tube (CRT), liquid crystal display, active matrix display, or plasma display, for displaying information to a computer user. An input device **613**, such as a keyboard including alphanumeric and other keys, is coupled to the bus **601** for communicating information and command selections to the processor **603**. Another type of user input device is a cursor control **615**, such as a mouse, a trackball, or cursor direction keys, for communicating direction information and command selections to the processor **603** and for controlling cursor movement on the display **611**.

According to an embodiment of the invention, the processes described herein are performed by the computer system **600**, in response to the processor **603** executing an arrangement of instructions contained in main memory **605**. Such instructions can be read into main memory **605** from another computer-readable medium, such as the storage device **609**. Execution of the arrangement of instructions contained in main memory **605** causes the processor **603** to perform the process steps described herein. One or more processors in a multi-processing arrangement may also be employed to execute the instructions contained in main memory **605**. In alternative embodiments, hard-wired circuitry may be used in place of or in combination with software instructions to implement the embodiment of the invention. Thus, embodiments of the invention are not limited to any specific combination of hardware circuitry and software.

The computer system **600** also includes a communication interface **617** coupled to bus **601**. The communication interface **617** provides a two-way data communication coupling to a network link **619** connected to a local network **621**. For example, the communication interface **617** may be a digital subscriber line (DSL) card or modem, an integrated services digital network (ISDN) card, a cable modem, a telephone modem, or any other communication interface to provide a data communication connection to a corresponding type of communication line. As another example, communication interface **617** may be a local area network (LAN) card (e.g. for Ethernet™ or an Asynchronous Transfer Model (ATM) network) to provide a data communication connection to a compatible LAN. Wireless links can also be implemented. In any such implementation, communication interface **617** sends and receives electrical, electromagnetic, or optical signals that carry digital data streams representing various types of information. Further, the communication interface **617** can include peripheral interface devices, such as a Universal Serial Bus (USB) interface, a PCMCIA (Personal Computer Memory Card International Association) interface, etc. Although a single communication interface **617** is depicted in FIG. **6**, multiple communication interfaces can also be employed.

The network link **619** typically provides data communication through one or more networks to other data devices. For example, the network link **619** may provide a connection through local network **621** to a host computer **623**, which has connectivity to a network **625** (e.g. a wide area network (WAN) or the global packet data communication network now commonly referred to as the "Internet") or to data equipment operated by a service provider. The local network **621** and the network **625** both use electrical, electromagnetic, or optical signals to convey information and instructions. The signals through the various networks and the signals on the network link **619** and through the communication interface **617**, which communicate digital data with the computer system **600**, are exemplary forms of carrier waves bearing the information and instructions.

The computer system **600** can send messages and receive data, including program code, through the network(s), the network link **619**, and the communication interface **617**. In the Internet example, a server (not shown) might transmit requested code belonging to an application program for implementing an embodiment of the invention through the network **625**, the local network **621** and the communication interface **617**. The processor **603** may execute the transmitted code while being received and/or store the code in the storage device **609**, or other non-volatile storage for later execution. In this manner, the computer system **600** may obtain application code in the form of a carrier wave.

The term "computer-readable medium" as used herein refers to any medium that participates in providing instructions to the processor **603** for execution. Such a medium may take many forms, including but not limited to non-volatile media, volatile media, and transmission media. Non-volatile media include, for example, optical or magnetic disks, such as the storage device **609**. Volatile media include dynamic memory, such as main memory **605**. Transmission media

include coaxial cables, copper wire and fiber optics, including the wires that comprise the bus **601**. Transmission media can also take the form of acoustic, optical, or electromagnetic waves, such as those generated during radio frequency (RF) and infrared (IR) data communications. Common forms of computer-readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, any other magnetic medium, a CD-ROM, CDRW, DVD, any other optical medium, punch cards, paper tape, optical mark sheets, any other physical medium with patterns of holes or other optically recognizable indicia, a RAM, a PROM, and EPROM, a FLASH-EPROM, any other memory chip or cartridge, a carrier wave, or any other medium from which a computer can read.

Various forms of computer-readable media may be involved in providing instructions to a processor for execution. For example, the instructions for carrying out at least part of the embodiments of the invention may initially be borne on a magnetic disk of a remote computer. In such a scenario, the remote computer loads the instructions into main memory and sends the instructions over a telephone line using a modem. A modem of a local computer system receives the data on the telephone line and uses an infrared transmitter to convert the data to an infrared signal and transmit the infrared signal to a portable computing device, such as a personal digital assistant (PDA) or a laptop. An infrared detector on the portable computing device receives the information and instructions borne by the infrared signal and places the data on a bus. The bus conveys the data to main memory, from which a processor retrieves and executes the instructions. The instructions received by main memory can optionally be stored on storage device either before or after execution by processor.

While certain exemplary embodiments and implementations have been described herein, other embodiments and modifications will be apparent from this description. Accordingly, the invention is not limited to such embodiments, but rather to the broader scope of the presented claims and various obvious modifications and equivalent arrangements.

What is claimed is:

1. A method comprising:

polling a plurality of nodes within a network for configuration information, wherein the nodes are configured to establish voice sessions;

correlating the configuration information;

presenting a view of the nodes and associated circuits to a user for configuring one or more of the nodes based on the correlation; and

receiving input from the user specifying a first level of granularity associated with components and circuits corresponding to the nodes.

2. A method according to claim **1**, wherein the voice sessions are packetized.

3. A method according to claim **2**, wherein the nodes include a hybrid switch.

4. A method according to claim **1**, wherein the view is presented using a web interface to the user.

5. A method according to claim **4**, wherein the web interface provides a data collection screen that includes,

a user identifier section for specifying an identifier of the user,

a password section for specifying a password to logging into a particular one of the nodes,

a table name section for specifying a table corresponding to trunk groups associated with the particular node,

a network identifier section for specifying an identifier of the network, and

a node name section for specifying a name of the particular node.

6. A method according to claim **1**, wherein each of the nodes includes a core and a plurality of gateway controllers for controlling a plurality of packet voice gateways to establish the voice sessions.

7. A method according to claim **6**, further comprising:

determining a relationship of the core, the gateway controllers, and the packet voice gateways; and

storing the configuration information based on the determined relationship.

8. A method according to claim **1**, wherein the view is presented using a web interface to the user, the web interface providing a query screen for viewing the packet voice gateways.

9. A system comprising:

a plurality of nodes configured to establish digital voice sessions; and

a platform configured to:

poll the nodes for configuration information,

correlate the configuration information,

present a view of the nodes and associated circuits to a user for configuring one or more of the nodes based on the correlation in response to a command by the user, and

receive input, via a web browser, from the user specifying a first level of granularity associated with components and circuits corresponding to the nodes.

10. A system according to claim **9**, wherein the voice sessions are packetized.

11. A system according to claim **10**, wherein the nodes include a hybrid switch.

12. A system according to claim **9**, wherein the view is presented using a web interface to the user.

13. A system according to claim **12**, wherein the web interface provides a data collection screen that includes,

a user identifier section for specifying an identifier of the user,

a password section for specifying a password to logging into a particular one of the nodes,

a table name section for specifying a table corresponding to trunk groups associated with the particular node,

a network identifier section for specifying an identifier of the network, and

a node name section for specifying a name of the particular node.

14. A system according to claim **9**, wherein each of the nodes includes a core and a plurality of gateway controllers for controlling a plurality of packet voice gateways to establish the voice sessions.

15. A system according to claim **14**, wherein the platform is further configured to:

determine a relationship of the core, the gateway controllers, and the packet voice gateways; and

store the configuration information based on the determined relationship.

16. A system according to claim **9**, wherein the view is presented using a web interface to the user, the web interface providing a query screen for viewing the packet voice gateways.

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